Notebook, Cat. 585, 1898-1899

This notebook covers the period August 1898-January 1899. It was used primarily by Edison, but also by an unidentified experimenter (possibly H. M. Phillips), for notes and drawings regarding meter experiments. The book contains 201 numbered pages, most of which are blank.

Blank pages not filmed: 54-201.

Cat. 585

50
87

Plating Solutions
New Deposit Meter

Test Plating solutions

Aug 30 Nos. 9 & 10
Ag Sulphate in Ammonia
Time ... 3 hrs.
Current ... 10 Mill-amperes

Init wts.	Final wts
#9. 2.557	2.6735
#10 - 2.5678	2.4719

Gain plate - 3.883
Loss plate - 3.196

Remarks
Warty - come off - Edges - hard - long warts easily detachable
Loss plate coated with bad silver
N. G.

Aug. 30 Nos. 11 + 12
Fluate silver
Time - - - 3 hrs
Current - - - 10 Mill-amperes

Init wts.	Final wts
#11 ... 2.5544	2.7740
#12 ... 2.4705	2.3540

Gain plate - - - 7.320
Loss " - - - 3.550

Remarks
Gain - Fluate Silver
Warty - black globules - N. G.
Loss - Brownish - N. G.

Aug 30 Nos. 13-14
Ag Carbonate & Ammonia
Time - - - 2 hrs. 6 min.
Current - - 10 Mill. amperes

Initwants	Final wts
#13 - 2.1070	2.2658
#14 - 2.6230	2.4847

Remarks
See next Page

Aug 30 No. 13.14

Saucers #12 - was dirty + brownish back-ground

Loss plate in old Equinde plate cant tell about it

N. G. anyway

Silver Carbonate in Ammonia gathers a brown sediment in bottom -

Aug 30 No. 15-16

Chlorate of silver

Time: 2 hrs. 7 min. 10 Mill amperes

	Initials	Final wts
#15 -	2.3700	2.4559
#16 -	2.7482	2.6632

Gain plate 3995

Loss " 4047

Remarks

Chlorate silver in water turns black top of liquid gathers a film from action of light or air which is bright silver light

Chlorate gain plate -

No warts perfect

Loss plate perfect -

10 Mil amperes one hour

Notes -

Solution of Chlorate of Potassium and Nitrate Silver in water plating dense and fine, smooth, perfect and adherent, plating off plate perfectly even fine grain - no pitting - G 3995 L 4047

Sulphate Silver in Ammonia - not a great amount dissolves seems less soluble in Nitly than most silver salts, Deposit plate warty, comes off from edges, easily detachable warts Loss plate coated with sulphate of silver crystals - NG

G 3883 L 3196 -

Picate silver in water - got too much picric acid Crystalized out in cell - Gain plate warty black globules, Loss plate Brownish NG

G 7320 L 3850

Carbonate of Silver in Ammonia - warty Gain plate has brownish ~~black~~ background. Loss plate being one previously used Cant tell anything about it - NG

G 7561 L 8014

Chlorate Silver Nitrate Silver with Ammonia Gain plate somewhat warty but thinks warts not very detachable Loss plate good but looks as if something had dissolved but leaving hazy spongy surface

G 3890 L 4242

Phosphate Silver in Glacial Phosphoric Acid Gain plate spiral worms scratches off with finger nail - also darkened - Loss plate perfect.

G 3892 L 4126

Silicofluoride Silver & Nitrate Palladium
Large isolated warts on gain plate also
red crystals all over plate Loss plate full of
red crystals & brownish – G 5390 L 3715 –

Arsenate of Silver in Ammonia, Bright
Continuous deposit not detachable but wavy
should say it was perfect Loss plate has a
fine grain but filamentary, spongy but OK I
think – G 4200 L 4150

Chromate of Silver in Ammonia Warty on
gain plate Crystals rather adherent. Loss
plate good – G 4130 L 4225 –

Bichromate of Silver in Ammonia, Gain plate
Warty but adherent. I think loss plate
good possibly slightly spongy
G 4180 L 4085 –

Arsenate of Silver in arsenic acid
Millions of curled special filaments – seems to
be adherent plate dark – Loss plate
perfect, G 4675 L 4125 –

Orthophosphate Silver in Ammonia
gain plate bright, not warty good
Loss plate not smooth Eaten away
in lines probably OK –
G 4000 L 4153

Oxalate Ag in NH_4
Gain 4100 L 3915

Fluoride Ag in Nitrate K
G 3950 L 3960

Acetate Ag in NH_3
G 3960 L 3915

Iodate Ag in NH_3
G 4100 L 3915

Perchlorate Ag in NH_3
G 4050 L 3965

Nitrite of silver in Nitrite of Potash very fine surface on gain plate, its dark when viewed in one direction bright when viewed in another direction its a very perfect deposit, finger nail causes surface to become bright — loss plate fine surface but apparently spongy —
G 4315 L 4375

Notes on appearance of Solution

Silicofluoride Ag in Nitrate Potash affected by light, turns black.

Chlorate Ag + Nitrate Ag in water turns black on top to a silvery film finally the whole of the jar becomes coated with a bright silver film — quite adherent & perfect

Silver Carbonate in Ammonia gathers a Brown sediment in bottom of jar —

Orthophosphate of silver in Ammonia gathers a whitish sediment in bottom of jar —

Chlorate Ag Nitrate Ag in Ammonia gives white sediment in bottom of jar

Sept

at 850 pm put two new silver plates in a solution of Chlorate of Potash + Nitrate of Silver & put on Current of 10 milliamperes which is to be run for 60 minutes for Examination under the Microscope to verify previous Experiments

Chlorate of Potash does not precipitate Nitrate of silver probably for reason that Chloric acid has more affinity for K than Nitric acid hence it is a mixture yet I thought I got a precipitate when I made the first solution the test of which is recorded on page 3 –

The old liquids used in previous experiments have been filtered + water added + to those which had ammonia in fresh has been added — immediately on filtering the jars were placed in black paper covers so light does not strike them contemporaneously — I have also made a number of new solutions —

Took plates out, ~~[illegible]~~ Gain plate large warts 1/16 apart – Loss plate perfect – This is probably due to weak solution – Next experiment will tell –

Started new pair plates in stronger solution of Nitrate of silver + saturated solution Chlorate Potash – On at 1010 pm –

I shall shake solution at times to give circulation –

Gain Electrode same warts NG –

In looking over old plates I notice little Arsenate Ag in Ammonia gives good Gain + lose plates

also Bichromate Ag in Nitry
" Chromate Ag in Nitry

I now make some oxide Ag by precipitating Nitrate Silver with KHO filter + dissolve in some old Chloric acid I have had in Lab for long time it is probably very weak - it however dissolves all the oxide readily leaving only a small amount of which precip. not so milligrms -
I think the solution has considerable free acid. may be a good deal as I used clean acid with very little water as I thought it very weak - We put in new electrodes and started at 11 15 pm -
Kellogg must have mixed Electrodes + called Electrodes which were in some unknown ~~Acid~~ Solution by name of Chlorate Electrodes. This renders it necessary to go all over the Experiments again +

~~Gain~~ Gain plate very long beautiful crystals entirely unlike any have seen - no good for us

At 1158 put in old solution with new electrodes Solution Arsenate of Silver dissolved in Ammonia 10 milamperes -
at End hour look out plate, even deposit but it seems to be very small notice shrinking -
I now at 1 am put it back and put on 20 Milamperes - at 130 took it out + it seemed to have gained but still it looks as if there was very little plating it looks so much like the original plate except it is spangly (12) bright places there is no warts or other things Extending outward at 133 put it back again with 20 Milamperes

2 am took it out again dont seem to change. I think it is plated for as a good plating
at 2 am Reversed the Current –
I may mention that it (is) the plating is different from what it plated before –
~~Put it back~~ was on till 4 20 am – looks plate OK – gain plate perfect – I notice some microscopic black spots very fine on gain plate – Solution is closed from light – took it out & looked at it its ~~decomposition~~ slightly brown milky with a little sediment in the Gallon –
It looks as if a stronger solution with our without excess of NH_4 would do Gallon, perhaps just a double salt of Ag & NH_4
without any free ammonia is what I wanted to obtain clean solution without black spots –

At 5,34 AM. Put 17 cells in series with 10 Milamperes to G2 run one hour + then have electrodes Examined –
All the Cells are in paper Covers + caps to keep out light + prevent evaporation –

Arsenate Ag in NH_4
Both the G + L plates are good – I notice some black specs on plates perhaps due to fact that solution is not as clean as when first filtered –

Chlorate of silver in NH

Bichromate Silver in NHy

G close dingy specimen - not detachable, more on one part plate than the other. Loss plate fair but not evenly cat. shows rolling marks in Rubber - finger wipes something away & reveals dirty white - this makes it bad -

Acid Dichlorophthalic ~~NHy~~ Nit Silver Sol part

G plate blue no crystals even blue but rub off - pale yellow Loss plate good blue there is a faint dirt rubbed off then its dirty white - This dirt may be in the silver ?

Dithonic acid combined with Potash to make Dithoniate of Potash + then precipitated with Nitrate Silver to ~~give oxide silver~~ precip dissolved in NHy - Gain plate dark even wont rub or wash but there are black points extending outwards, must look at this again - Loss plate pretty even finger rubs off nothing its white & looked bad ok if G plate was ok (my reversal)

Nitrate Silver & picronitric acid

G plate great crystals extending outwards - L plate had chemical crystals of picronitric acid on it - its not very good -

Monobromoacetic acid + Nit silver Saturable part

Both plates coated with a precip - solution free of precip

Acid Dichlorophthalic + Nitrate Silver NHy ~~Sol part~~

G plate fine cubic crystals think attached well but with more placing would probably grow to be dichroic - Loss plate has some dark crystals on it - & dark spots that wont rub off those which chemicals I have noticed in Silver Loss plates doing so in this solution merely free + notice part is orange) & appear to grow wonderfully probably so - Loss plate kills this solution -

Citrate Silver in NHy

Both plates good Gain plate no sign of crystals L plate tinted slightly + very small amount rubs off - but think its in the silver,

Nitrate Silver & Trichloracetic acid
G plate very peculiar crystals, mirror - very easily detachable
L plate also colored with a precip - L plate colored with precip

Permanganate Potash - Nitrate Silver - clear solution -
Ng + Eat off wire - deposits chocolate crystals -

Malic Acid Ag in NH4
L plate good - G wants like nuggets + only in spots - and along the edges due to rubbing off color also don't think it will do -

Permanganate Silver in Ammonia -
Thin coat of peculiar flat crystals on grain plate
detachable - L plate full ferric oxide color spots -

Tungstate Ag in NH4
G plate good - fine - Loss plate good fine - some darkening
& diff rub off on L plate - very little, must be silver -

Nitrate Potash & Nitrite Potash
G plate dark ~~was~~ don't rub off - no sign of crystals - L plate
can rub something off - not very thick, may be the comparison
in silver or possibly the dark grain plate is dark - stained except
with this solution -

Bromate Ag in NH4
G plate cubic crystals probably detachable, L plate got
black specs - ~~not~~ very slightly, but, not rubbed off -
This solution probably not good

Pyrophosphate Ag in NH4
Both plates tinted a dark in streaks, don't rub off
G plate square crystal wanted probably rub off -
This solution probably not good -

Chromate Ag in NH4
Grain P good - fine closely clinging leaflets not detachable
Loss plate not even - after washing the most dried white
fingers rubbed off the darkening matter. This is bad -

Arsenate Ag in Ammonia is good

Tungstate of Ag in Ammonia good

Citrate of Ag in Ammonia good

Nitrite Ag + Potash Nitrite - may possibly be worked up good

Further Experiments -
Started 1.22 with 10 milliamperes

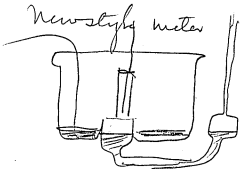
Borate of Silver in Ammonia
G plate dark all over no crystals dont rub off
may be plated finely divided silver hence black - L plate
ok - faint tint rubs off by fingers - Look into this Sol

Tartrate Silver in Ammonia
Both plates good - no sign of crystals on gain plate looks
just like original - perhaps the light on first has taken all the
silver out - L plate off color rubbed off by finger
Look into this

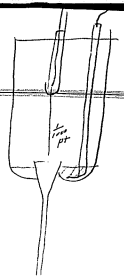
Tungstate Silver in Ammonia strong solution should
say 3 times more silver than in 1st Experiment
G plate plates same as weak solution except
that it has ~~some~~ light yellow spots also dark shade
can see infinitely minute glistening plates fast or
close down to plate its ok & chunky. The yellow
may be action on impurities - L plate fine good
just a little tinted rubs off by finger -
a solution that intermediate probably be good
also try more or less Nitrite or no Nitrite may possibly double salt -

Phosphotungstate Silver in Ammonia
G plate little dark dont rub off no crystals
plate seems as original notice no clag when
washed plate in water perhaps silver adherent
way in filter - plate good - little that rubbed
off By finger it looks as if this is impurities in
~~Sil~~ Silver - Investigate this solution -

Electrodes used had previously been used &
then put in Nitric acid to clean off deposits
Ok under Microscope with low power -



Solution No 1 70 cc water. 6 grammes
Cyanide of Mercury. stir well & there will
remain a residue put in ... grammes of
Merck Cyanide Potassium, filter till water
white clear -



Solution Mercurous Nitrate, slightly acid —
2600 ohms in circuit ~~1 cell Daniell~~ —

Res with 1 cell Daniell —		19
" 2	"	17
3		17
4		$16\frac{1}{2}$
5		$16\frac{1}{2}$
6		$14\frac{1}{4}$
7		14.8

~~Res~~ with 7 cells +	2000 ohms	Res	$15\frac{1}{2}$
	1500	"	15.3
	1000	"	13 —
	800		15.3
	600		15
	400		15 —
	200		14.8
	100		14.5 —
Back to 1 cell +	2600 ohms	Res	19
"	12600	"	27

two platina wires not amalgamated placed in Mercurous nitrate with little free acid. no Hg at Either pole—

	ohm	Res
1 cell	1000	1670
"	2000	2850
	3000	3850
	4000	4800
	5000	5800
	6000	6700
	7000	7600

Same with one pole touching a globule of Hg

	ohm
0 res	10.5
1000	11.5
2000	12.5
3000	14.0
4000	15.0
5000	16.0

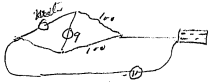
Standard Solution HgCy Kcy 1500 cc H_2O 100 grms HgCy 100 grms KCy — to which is added an additional amount of KCy being running 60 hours on 5 Milamp — Hg rather dirty at bottom + dark sediment there.

1 cell A

0 Res	92
100	135
200	173
300	205
400	239
500	270
800	350
1100	420
1400	490
1800	570

Standard Solution 1500 cc H_2O 100 grms cadmium Cy Key

Cell been running several days or formally used a silver Electrode in 12 hours also used aluminum Electrode in 15 minutes 12/1000 pt wire –



O Res	ohm
200	182
300	460
400	565
500	670
600	780
700	690
800	750
900	795
1000	810
1100	840
1200	840
1300	840
1400	855
1500	870
1600	900
1700	940
1800	960
1900	995
2000	1035
	1070

Yellow Nitrate Hg from Lamp-factory Cutting Hg + free HNO_3 — been running about 60 hours
12/1000 pt Elec - Sodium Amalgam Cathode, 1 cage Band

	Res
0 Res —	4.75
100	5.5
200	6.25
400	7 00
500	8 05
600	9
700	10
800	10.5
900	11.5
1000	12
1100	13
1200	14
1500	16
1800	19

Saturated Cold Solution HgCy only
12/1000 pt Elec cage

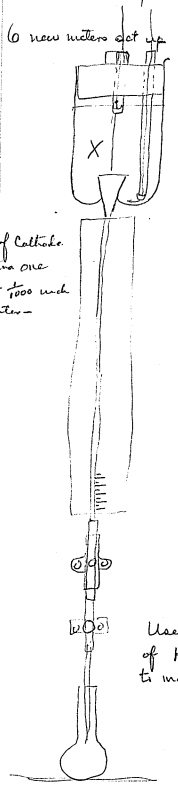
0 Res	2750
1000	3700

Yellow Oxide of Hg dissolved in Hot KCy
washing Else, quite strong solution only
diluted ~~to~~ to prevent Crystallization,
pbly be Oxycyanide.

	ohm
Res 0	295⁻
100	435⁻
200	570
300	660
400	620
500	500
600	400
700	350
800	330
900	325⁻
1000	315⁻
1100	315⁻
1200	325⁻
1300	330
2000	350
Res 0 —	305⁻

Wednesday Janey 4 99

6 new meters set up



length of Cathode of platina one inch & 1/1000 inch diameter—

With ·02 Shunt.

1000 ohms resistance in cell circuit
10 lamps 3·1 watt per candle 110 Volts
Current full load 9/100 of Milliamperes
Loss in shunt 10 lamps 16/100 of 1%
" " 20 " 64/100 "
deposit of Mercury per hour with full load - 6·78 milligrams
of 90 full hours month length Mercury Column 10 lamps basis - 61 milligrams or 1½ inches on No 2 meter scale — with ·04 shunt double this — which is about right.

Scale 40 division to the inch — Thermometer tubing, supposed to be 15/1000 bore but varies as tests show —

No 1 Meter	·84	deg to 1	milligramme
2 "	1·02	"	"
3	·99	"	"
4	·845	"	"
5	·83	"	"
6	1·02		

Used water in X to which 3 or 4 drops of HNO_3 Specg 1·2 Merck Reagent was used to make mercury column clean

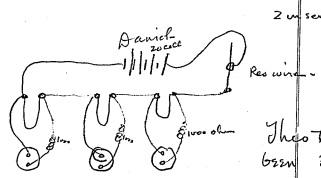
Meter No 4 Has an initial Hg Column - of 15 deg - E & P - 16½ ✓

Meter No 2 13 Phillips - 13 Edison 16 | 3

No 3 14 Phillips 14 full Edison. 17 3/4 3 3/4 @ 7½

Put Current on at 11 45 am Jany 6th = 16 1/4 hours

Amperes. Four,



Theo test should have been 30/100 ohm 25/100

Shut off Current 6 pm Jany 6
Current on 8 am " 7

No 1 taken out because during night smack initial Column went down below + we couldn't get it so put No 4 in place at 10 40 - AM - 7½ Initial Column 15 degrees -

New test with solution of white salt

dissolved in water without scarcely any acid. ~~[illegible]~~ filtered + put in bottle with free Hg in one days crystals deposited in bottom bottle left at that way for a week then chilled it down to 43 nothing deposited filtered This is the solution used on test it measured 14 on 600 ohms with 1 cell + 27 on 12600 ohms 1 cell — think there was some action on Hg —

	Edison	Phillips
No 4 Meter initial Column	23	22.5
" 2	31.6	31.5
" 3	41	41
4 after about 8 hours — Phillips failed keep time	25.5	25.5
	34 1/2	34
	42 1/2	42 1/4

West end this morning 8 am January 10/99

No 4 Shunt gave on Volt meter	7.8	division	
No 2 "	7.8		Cockenwelly Volt
" 3 "	9.4		Meter measuring
			1/100 Volt —

If Voltmeter is correct the deposit per hour for the various ohms be for

	measured		measured —	
No 4	.568	milligram	.284	milligram
" 2	.568	"	.284	"
" 3	.687	"	.343	"

No 4 1 deg 2 hours 4 mm No 2 1 hour 43 No 3 1 hour 26

Read Meter at. 4.55 pm Jany 10 99

Having been on for 8 hours 55 minutes

	Edison	Phillips
No 4	28.5	28.5
2	37.8	37.75
3	47.	47

Note (tapped) electrode to get globules off —

Reading at middle scale -

	Edison	Phillips
No 4	28.5	
2	37	36.75
3	45.75	45.5

6.20 pm -

Reread meters in middle focus -

	Edison	Phillips
No 4	29.3	29.3
" 2	38	38
" 3	46.5	46.75

3 shunts in series - giving ~~[illegible]~~ of 26.8/100 of Volt. The 3 meters being multiple arcd across the 3 shunts, 4 amperes on —

Shut off current 11.30 P.M. 4.40

Read meter for deposit from 6.20 pm till 11.30 pm —

		Edison	Phillips
No 4		37.5	37.75
2		47.5	47.5
3		54.5	54.25

Reading Corrected to tubes 9.7 milligrams
9.3 "
*8.0

Theoretical 9.7

* something wrong with this meter it never read right.

Started 11th 99 at 8.15 AM — above is reading

Read at 6.35 pm — shook globules off

Readings were

		Edison	Phillips
No 4	mean 55.72	55.95	55.25
2	69.12	69.[illegible]	69.25
3	73.75	74	73.5

No 4 gained 18.1 deg
2 27.6
3 19.4

Theoretical by formula 20.7

Theoretical by Watson 25

Reading Corrected for tubulation

No 4 21.5 milligrammes
No 2 27.2
" 3 19.6

Theoretical ~~20.7~~ but our tubes must be incorrect

Shut off current 11-40 PM —

Read above at 8 am —

Watson gives 24.4 / 100 Volt
Bennett 26.8
Rowland gives 20.7
Wood 19.6 —
by tables Bennett

Reading from 11th = see last page

	Mean	Edison	Phelps
No 4	65.07	65.15	65
2	79.1	79	79.2
3	82.25	82.5	82

Corrected for lubrication

No 4	11.12
2	9.78
3	8.58

Correct deposit for 2 shunts
2.36 milligrams

Started 12th '99 8-45 A.M.

Read at 620 pm

	Mean	Edison	Phelps
No 4	82	82	82
2	99.87	99.75	100
3	101.41	101.33	101.5

Corrected for lubrication

No 4	20. milgrms	Theor'l P of all our meters are given at –
2	20.3	22.4
3	19.4	

Shut off current 6-35 P.M.
Current on 1-13-99 8-20 A.M.

Jan. 13 99

Current on 8-20 A.M.

off at 6 55

	mean	Edison	Phillips
Readings	100.72	101.25	100.2
	123.25	123.00	123.5
	123.50	124.	123.00

Corrected for tabulation

No 4	22.1	Theoretical
2	22.9	24.8
3	22.3.	Written ok. Something wrong while its drop down.

Jan 14 99.

Start 7-45 A.M.

	mean	Edison	Phillips
No 4	118.6	118.7	118.5
2	145.37	145.75	145
3	145.65	145.5	144.8

Read at 6

Correct for tabulation

No 4	21.2	Theoretical
2	21.7	24.2
3	22.3	

3 | 65.2
21.7 3

Reading No 4 from table below		119.5 E	
	2	147 Philip	147.8 E
	3	146.5	146.5 E

Latest Constant
249 Melghr hour
~~Not Copied~~

We let Hg column run out & put it back - to check =

Current off at 6-22 - PM -

Jan 16 1899 -

Current on 8 - A.M -
Current off 10-50 A.M -

Started on 1/2 ampere through the shunt at 1115 am 16th 99 -

No 4 Read constant.	104.4
2	152.8
3	153.4 -

take off ten minutes from time as we had Current off 10 min -

Current disconnected at 620 pm

		Mean	Edson	Phillips
Column Read	No 4	106.75	106.5	107
	2	154.135	154.7	154
	3	155.45	155.7	155.2

Correct for Calibration

No 4	2.78
2	1.52
3	2.16

7 h 5 minutes

4.02

Jan. 17 1899.

Current on at 8-5 A.M. —
stopped 5.40.
4 amperes —
Checked one meter with a
Silver CCCC —
No 4 with silver cell in
Corrected 23.9 milpmi

Edison	Phillip
129.	127

9 gm on Silver 11.6 mg
Loss 12.7. "

Mercury Calls for 12.8 of silver —

Jan. 20 1899 –

3 Shunts –
4 Amp –
Silver cell with #4 meter –
Start meter #2 & 3 at 8 A.M. –
Start meter #4 9.20 A.M. –
Zero reading #4 #2 #3 –
21.0 41.4 37.3

Reading at 9 AM –	39.2	–	1.9
" " 10 "	41.8	–	2.6
" " 11 "	44.4	–	2.6
" " 12	46.6	–	2.2 –
" " 1 P.M. –	49.0	–	2.4
" " 2 "	51.4	–	2.4 –
" " 3 "	53.7		2.3
" " 4 "	55.4		1.7
" " 5 "	58.5		3.1
" " 6 "	60.7		2.2 –

Voltage on shunts by Weston – ~~35.4~~ Weston 35.34
" " " by Clark Cell – 35.2
Wt. of Zn – per hr. Hg – then – #2 2.48 #2 2.43
" " " " Ag – " 1.50 2.57
" " " " 1.36 2.48
" " " " 1.29
Weight of silver electrodes at start – 224.4 - 97.8
" " " " finish 213.4 - 98.9
Gain in Wt. per hr. from #4 2.38 #2 – 2.51 #3 - 2.36
" " " silver – 11.1 #4
" " " per hour #4 #2 #3
" " " " " silver – 1.28
Voltage on meter #4 Clark cell .339

Calculations made with Clark Cell reading which are 32/p above meter –

Current off 6 –

Jan 21 1898 —

Three meter cells in series with Ag. Cell. 1 1000 ohm coil, three shunts in series as before —

Current 0.1 amp —

	#1	#2	#3
Meter reading at start.			
" " " finish	1.1	1.2	0.8

Start 7.45 AM. 6.40 P.M —

Stop — ~~Read~~ —

Jan 22 3 —

Read 8 A.M —